



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.  | CONFIRMATION NO. |
|---|-------------|----------------------|----------------------|------------------|
| 10/717,896  | 11/21/2003  | Michio Takagaki      | Q78597               | 7385             |
| 23373   | 7590        | 06/27/2005           | EXAMINER             |                  |
| SUGHRUE MION, PLLC<br>2100 PENNSYLVANIA AVENUE, N.W.<br>SUITE 800<br>WASHINGTON, DC 20037 |             |                      | RAABE, CHRISTOPHER M |                  |
|   |             |                      | ART UNIT             | PAPER NUMBER     |
|   |             |                      | 2879                 |                  |

DATE MAILED: 06/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/717,896

Applicant(s)

TAKAGAKI ET AL.

Examiner

Christopher M. Raabe

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM  
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 4/14/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless —(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 6,8,11,12,14,15 are rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi et al. (U.S. Patent 6265827).

With regard to claim 6,

Takahashi et al. disclose a mercury-free arc tube for a discharge lamp unit, comprising: a closed glass bulb (column 1, lines 17-18) having a first end closed at a first pinch seal and a second end closed at a second pinch seal (103 of fig 12); and a first electrode extending into said closed glass bulb from said first end, and a second electrode extending into said closed glass bulb from said second end (104 of fig 12), wherein said closed glass bulb contains a mixture comprising a primary light-emitting halide and a starting rare gas (column 4, lines 4-9), and wherein a total amount of metal halides in said mixture is between 10 and 30 mg/ml (column 9, lines 15-22), and about 15 W to 30 W is required to power said arc tube (column 10, lines 36-40).

With regard to claim 8,

Takahashi et al. disclose the arc tube, wherein said mixture further comprises a buffer metal halide (column 4, lines 7-11) that includes at least one of an Al halide, a Cs halide, an Ho halide, an In halide, a Tl halide, a Tm halide and a Zn halide (column 4, lines 7-11; column 7,

Art Unit: 2879

lines 50-62; and column 9, lines 15-20), and a ratio of said buffer metal halide to a total amount of metal halides is between 0 and 50 percent (column 9, lines 15-22; and column 7, lines 50-62), and further wherein said primary light-emitting halide comprises at least one of a Na halide, a Sc halide and a Dy halide (column 4, lines 5-6).

With regard to claim 11,

Takahashi et al. disclose the arc tube, wherein a diameter at a middle portion of said glass bulb is between about 1.5 mm and 2.7 mm (column 7, lines 40-41, 50-51).

With regard to claim 12,

Takahashi et al. disclose the arc tube, wherein a distance between said first electrode and said second electrode that extend into said glass tube is between about 1.0 mm and 4.0 mm (column 7, line 51).

With regard to claim 14,

Takahashi et al. the arc tube, wherein said starting rare gas is xenon, having a pressure between about 8 atm and 20 atm (column 3, line 5), and said first and second electrodes are tungsten electrodes (column 1, line 21).

With regard to claim 15,

Takahashi et al. disclose the arc tube, further comprising molybdenum foils pinch-sealed into said first and second pinch seals, and connected to outer ends of said first-and-second electrodes, respectively, wherein said closed glass bulb is spheroidal and said pinch seals are substantially rectangular.

3. Claims 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Ishigami et al. (U.S. Patent 6353289).

With regard to claim 18,

Ishigami et al. disclose a lighting circuit (column 49, lines 47-50) for supplying electricity to an arc tube for a discharge lamp unit that includes a closed glass bulb having a first electrode extending into said closed glass bulb from a first end and a second electrode extending into said closed glass bulb from a second end (figure 3), said lighting circuit comprising: a switching regulator coupled between a battery and said arc tube, for converting a battery voltage from said battery into a tube voltage (column 48, line 66 – column 49, line 4); a control circuit coupled between said switching regulator and said arc tube, for detecting said tube voltage and a tube current of said arc tube as a feedback signal, and controlling said tube voltage output by said switching regulator in response to said feedback signal (column 48, line 66- column 49, line 27); and a starter circuit that receives said tube voltage controlled by said regulator, and outputs said tube voltage to a first electrode of said arc tube (column 48, line 66- column 49, line 27), wherein said lighting circuit is coupled to said first electrode and said second electrode (fig 26), and about 15 W to 30 W is provided to said arc tube (column 10, lines 36-40).

With regard to claim 19,

Ishigami et al. disclose the circuit, further comprising a DC/AC converter coupled between said control circuit and said starter circuit, that converts said tube voltage output from said switching regulator from a DC voltage into an AC voltage (column 49, lines 47-67).

With regard to claim 20,

Ishigami et al. disclose the circuit, wherein said tube voltage output is received by said starter circuit as a DC voltage (column 48, line 66 – column 49, line 35).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claim 1,2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (U.S. Patent 6265827), in view of Eastlund et al. (U.S. Pre-grant Publication 2002/0070668).

With regard to claim 1,

Takahashi et al. disclose a mercury-free arc tube for a discharge lamp unit comprising: a spheroidal closed glass bulb (column 1, lines 17-18); a pinch seal on each end of the closed

glass bulb (103 of fig 12); and opposing electrodes disposed in the glass bulb (104 of fig. 12), the glass bulb being filled with a primary light-emitting metal halide and a starting rare gas (column 4, lines 4-9), a pressure of the starting rare gas being 8 to 20 atm (column 3, line 5), wherein an inner diameter of the glass bulb at a middle part between the opposing electrodes is 1.5 to 2.7 mm (column 7, lines 40-41, 50-51), a distance between the opposing electrodes is 1.0 to 4.0 mm (column 7, line 51), and a stable discharge is produced with a power of 15 to 30 W (column 10, lines 36-40).

Takahashi et al. do not disclose a length each of the electrodes extends into the glass bulb.

Eastlund et al. do disclose a length each of the electrodes extends into the glass bulb being 0.3 to 1.8 mm (paragraph 82).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the dimensions disclosed by Eastlund et al. into the mercury-free arc tube for a discharge lamp unit of Takahashi et al. in order to provide a good arc with ample luminescence.

With regard to claim 2,

Takahashi et al. a mercury-free arc tube, further comprising a buffer metal halide (column 4, lines 7-11), wherein the primary light-emitting metal halide is at least one member selected from an Na halide, an Sc halide, and a Dy halide (column 4, lines 5-6), the buffer metal halide is at least one member selected from an Al halide, a Cs halide, an Ho halide, an In halide, a Tl halide, a Tm halide, and a Zn halide (column 4, lines 7-11; column 7, lines 50-62; and column 9, lines 15-20), the total amount of the metal halides in the glass bulb is 10 to 30

Art Unit: 2879

mg/ml, and the ratio of the buffer metal halide to the total amount of the metal halides is 0 to 50% by weight (column 9, lines 15-22; and column 7, line 50).

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al, and Eastlund et al. as applied to claim 1 above, and further in view of Matthews et al. (U.S. Patent 5239230).

With regard to claim 3,

Takahashi et al. disclose a mercury-free arc tube.

Takahashi et al. do not disclose a ratio of an inner diameter D2 of the glass bulb at tips of the opposing electrodes to an inner diameter D1 of the glass bulb at the middle part between the opposing electrodes (D2/D1) being 0.5 to 1.0.

Matthews et al. do disclose a ratio of an inner diameter D2 of a glass bulb at tips of opposing electrodes to an inner diameter D1 of a glass bulb at the middle part between opposing electrodes (D2/D1) being 0.5 to 1.0 (column 2, lines 29-36).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the shape disclosed by Matthews et al. into the mercury-free arc tube of Takahashi et al. in order to provide a discharge space optimized for the corresponding discharge gap.

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. and Eastlund et al. as applied to claim 1 above, and further in view of Ishigami et al. (U.S. Patent 6353289).



With regard to claim 4,

Takahashi et al. disclose a mercury-free arc tube.

Takahashi et al. do not disclose a ratio of a tube current  $I$  (unit: A) supplied to the arc tube to the outer diameter  $d$  (unit: mm) of the electrodes sticking out inside the glass bulb ( $I/d$ ) being 1.0 to 4.0 (A/mm).

Ishigami et al. do disclose a ration of a tube current  $I$  (unit: A) supplied to the arc tube to the outer diameter  $d$  (unit: mm) of the electrodes sticking out inside the glass bulb ( $I/d$ ) being 1.0 to 4.0 (A/mm) (column 41, 55-60, and column 39, lines 5-25).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the dimensions disclosed by Ishigami et al. into the mercury-free arc tube of Takahashi et al. in order to provide good arc and ample luminescence.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. and Eastlund et al. as applied to claim 1 above, and further in view of Ishigami et al. (U.S. Patent 6353289) and Cox et al. (U.S. Patent 4949003).

With regard to claim 5,

Takahashi et al. disclose a mercury-free arc tube.

Takahashi et al. do not disclose a cylindrical glass shroud integrally welded to said arc tube to provide a closed space enclosing the glass bulb, the closed space being filled with an inert gas at a pressure of 1 atm or lower.

Ishigami et al. do disclose a cylindrical glass shroud to provide a closed space enclosing a glass bulb (column 17, lines 39-43), the closed space being filled with an inert gas at a pressure of 1 atm or lower (column 33, lines 46-47).

Cox et al. do disclose a cylindrical glass shroud integrally welded to an arc tube (column 10, lines 15-30).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the glass shroud of Ishigami et al. and Cox et al. into the mercury-free ac tube of Takahashi et al. in order to protect the glass bulb from the outside environment.

9. Claims 7,17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. as applied to claim 6 above, and further in view of Ishigami et al. (U.S. Patent 6353289).

With regard to claim 7,

Takahashi et al. disclose the arc tube.

Takahashi et al. do not disclose a lighting circuit, coupled to said first electrode and said second electrode, for lighting said arc tube, including, a switching regulator coupled between a battery and said arc tube, for converting a battery voltage from said battery into a tube voltage; a control circuit coupled between said switching regulator and said arc tube, for detecting said tube voltage and a tube current of said arc tube as a feedback signal, and controlling said tube voltage output by said switching regulator in response to said feedback signal; a starter circuit that receives said tube voltage controlled by said regulator, and outputs said tube voltage to a first electrode of said arc tube; nor a DC/AC converter coupled between said control circuit and said starter circuit, that converts said tube voltage output from said switching regulator from a DC voltage into an AC voltage.

Ishigami et al. do disclose a lighting circuit, coupled to said first electrode and said second electrode, for lighting said arc tube (column 48, lines 47-50), including, a switching regulator coupled between a battery and said arc tube, for converting a battery voltage from

Art Unit: 2879

said battery into a tube voltage (column 48, line 66 – column 49, line 4); a control circuit coupled between said switching regulator and said arc tube, for detecting said tube voltage and a tube current of said arc tube as a feedback signal, and controlling said tube voltage output by said switching regulator in response to said feedback signal (column 48, line 66 – column 49, line 27); a starter circuit that receives said tube voltage controlled by said regulator, and outputs said tube voltage to a first electrode of said arc tube (column 48, line 66 – column 49, line 30); and a DC/AC converter coupled between said control circuit and said starter circuit, that converts said tube voltage output from said switching regulator from a DC voltage into an AC voltage (column 49, lines 47-67).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the lighting circuit of Ishigami et al. into the arc tube of Takahashi et al. in order to permit the arc tube to be lit by an AC current.

With regard to claim 17,

Takahashi et al. disclose the arc tube.

Takahashi et al. do not disclose a ratio of a received tube current ( $I$ ) to an outer diameter ( $d$ ) of said first electrode and said second electrode being between about 2.0 and 3.5 (should include units A/mm).

Ishigami et al. do disclose a ratio of a received tube current ( $I$ ) to an outer diameter ( $d$ ) of said first electrode and said second electrode being between about 2.0 and 3.5 A/mm (column 41, lines 55-60, and column 39, lines 5-25).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the dimensions disclosed by Ishigami et al. into the mercury-free arc tube of Takahashi et al. in order to provide good arc and ample luminescence

10. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. as applied to claim 6 above, and further in view of Mochiduki et al. (U.S. Patent 6274973).

With regard to claim 9,

Takahashi et al. disclose the arc tube, wherein said discharge lamp unit is used in a vehicle lighting system (column 5, lines 40-45).

Takahashi et al. do not disclose said first electrode being coupled to a metal lead support, and said second end being coupled to an insulating plug body.

Mochiduki et al. do disclose a first electrode being coupled to a metal lead support, and a second end being coupled to an insulating plug body (column 1, lines 23-39).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the structure disclosed by Mochiduki et al. into the arc tube of Takahashi et al. in order to firmly fix the arc tube within a vehicle lighting system.

11. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. as applied to claim 6 above, and further in view of Mochiduki et al. (U.S. Patent 6274973) and Ishigami et al. (U.S. Patent 6353289).

With regard to claim 10,

Takahashi et al. disclose the arc tube.

Takahashi et al. do not disclose a shroud integrally welded to said arc tube, wherein said shroud shields ultraviolet light in a wavelength range and maintains an operational temperature of said arc tube, said shroud being made of quartz glass doped with at least one of  $\text{TiO}_2$  and

Art Unit: 2879

CeO<sub>2</sub>, said wavelength range comprising ultraviolet rays harmful to the human body, nor a closed space defined by said closed glass bulb and said glass shroud being charged with an inert gas at a pressure of about 1 atm or less.

Mochiduki et al. do disclose a shroud integrally welded to an arc tube, wherein said shroud shields ultraviolet light in a wavelength range, said wavelength range comprising ultraviolet rays harmful to the human body, and maintains an operational temperature of said arc tube (column 4, lines 46-51), said shroud being made of quartz glass doped with at least one of TiO<sub>2</sub> and CeO<sub>2</sub> (column 5, lines 13-15).

Ishigami et al. do disclose a closed space defined by a closed glass bulb and a glass shroud being charged with an inert gas at a pressure of about 1 atm or less (column 33, lines 46-47).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the shroud of Mochiduki et al. and Ishigami et al. into the arc tube of Takahashi et al. in order to protect the glass bulb from the outside environment.

12. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. as applied to claim 6 above, and further in view of Eastlund et al. (U.S. Pre-grant Publication 2002/0070668).

With regard to claim 13,

Takahashi et al. disclose the arc tube wherein a length of a portion of said first electrode and said second electrode that extends into said glass tube is about 0.3 mm to 1.8 mm.

Art Unit: 2879

Takahashi et al. do not disclose the length that said first electrode and said second electrode extends into the glass bulb being 0.3 to 1.8 mm.

Eastlund et al. do disclose a length that a first electrode and a second electrode extend into the glass bulb being 0.3 to 1.8 mm.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the dimensions disclosed by Eastlund et al. into the mercury-free arc tube for a discharge lamp unit of Takahashi et al. in order to provide a good arc with ample luminescence.

13. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. as applied to claim 6 above, and further in view of Matthews et al. (U.S. Patent 5239230).

With regard to claim 16,

Takahashi et al. disclose the arc tube.

Takahashi et al. do not disclose a ratio of an inner diameter (D2) of said closed glass bulb at inner tips of said first and second electrodes extending into said closed glass bulb, to an inner diameter (D1) of said closed glass bulb at a middle portion of said closed glass bulb, being between about 0.7 and 0.9.

Matthews et al. do disclose a ration of an inner diameter (D2) of a closed glass bulb at inner tips of first and second electrodes extending into the closed glass bulb, to an inner diameter (D1) of the closed glass bulb at a middle portion of the closed glass bulb, being between about 0.7 and 0.9 (column 2, lines 29-36).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the shape disclosed by Matthews et al. into the mercury-free arc tube of

Takahashi et al. in order to provide a discharge space optimized for the corresponding discharge gap.

***Conclusion***

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patents 4992700, 5486737, 6774566, and Pre-grant Publications 2002/0047611, 2003/0189408.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher M. Raabe whose telephone number is 571-272-8434. The examiner can normally be reached on m-f 7am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CR

  
**ASHOK PATEL**  
PRIMARY EXAMINER